CHAPTER 4 · DESCRIBING MOTION AROUND US

PLAY & LEARN: THE INTERACTIVE WORKBOOK

Crosswords, word searches, scrambles, and quiz games.

Grab a digital marker. Work with your team. Solve the puzzles directly on the board.

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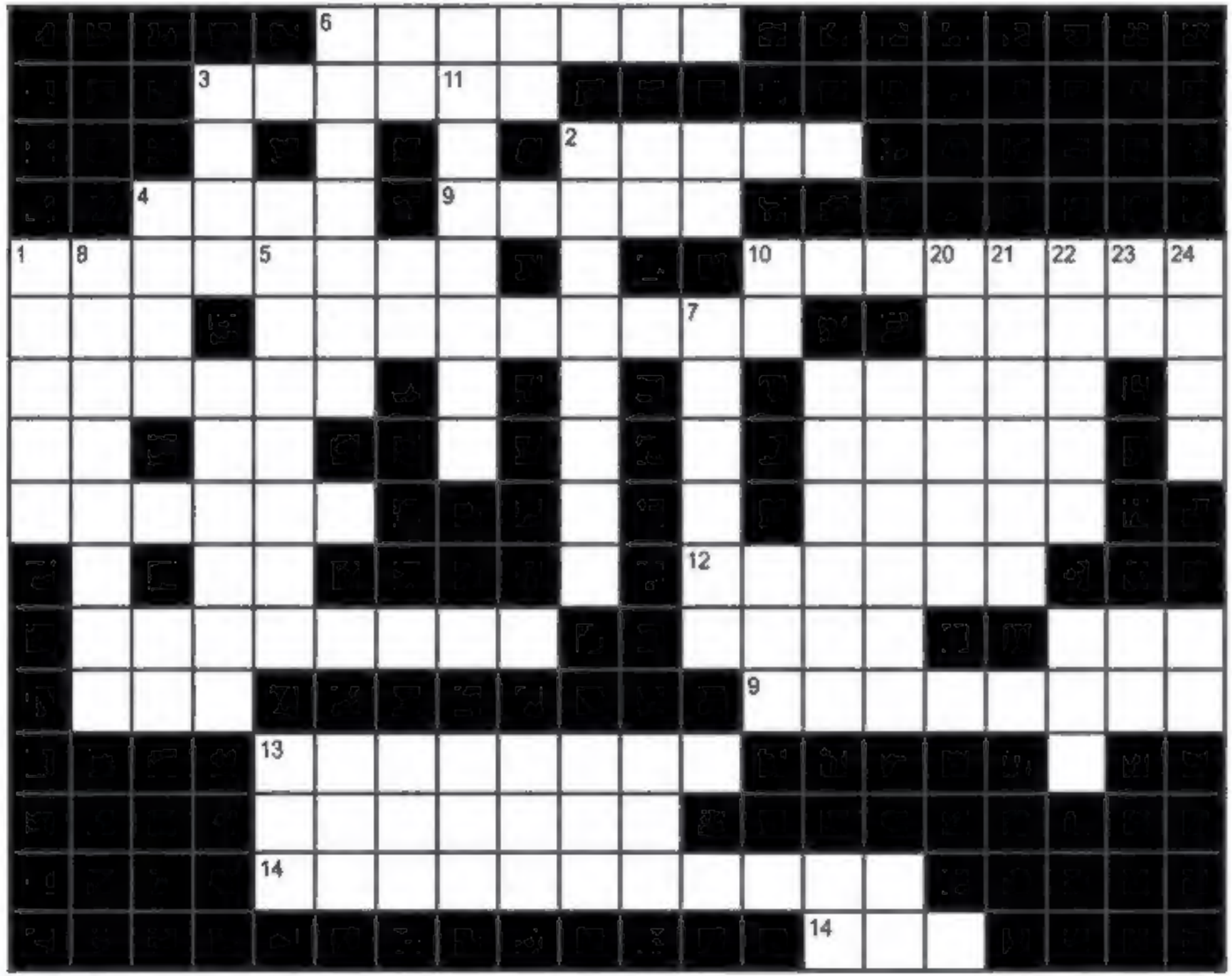
Puzzle 1 · The Crossword

Every answer is a word from this chapter. Fill the white squares — one letter per square.



ACROSS

5. net change in position, direction included (12)

10. ___ point — needed before you can describe position (9)

12. acceleration that always points toward the centre of a circle (11)

13. ___ distance — quadruples when speed doubles (7)

14. a quantity with magnitude and direction (6)

DOWN

1. the fixed reference point of a coordinate system (6)

2. on a graph, the rate of change shown by the incline (5)

3. the branch of physics describing motion (10)

4. negative acceleration; slowing down (11)

6. rate of change of velocity (12)

7. the direction a whirled stone flies off in when released (7)

8. speed together with direction (8)

9. ___ velocity — constant speed and direction (7)

11. total path length travelled, direction ignored (8)

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Puzzle 2 · Word Search

16 terms are hiding in the grid — across, down, diagonally, and backwards. Circle each one, then tick it off the list.

Z	G	J	W	F	R	O	R	W	H	P	A	R	G	O
C	I	R	C	U	L	A	R	Q	Q	W	Q	M	H	R
Q	A	C	C	E	L	E	R	A	T	I	O	N	U	I
G	W	T	O	E	C	N	A	T	S	I	D	J	N	G
W	R	A	D	I	U	S	S	P	E	E	D	O	I	I
K	E	L	D	B	Q	N	O	I	T	O	M	Z	F	N
L	X	G	J	W	R	M	S	Y	F	B	V	D	O	X
N	D	I	S	P	L	A	C	E	M	E	N	T	R	G
E	H	M	J	G	N	W	K	J	R	S	H	Y	M	I
X	B	B	P	T	I	I	R	I	R	A	L	A	C	S
V	E	L	O	C	I	T	Y	G	N	N	W	L	G	M
B	O	M	W	G	H	G	K	L	J	G	W	L	D	Y
G	C	H	T	E	P	O	L	S	W	P	P	O	U	I
V	F	N	B	C	R	O	T	C	E	V	P	E	J	Z
P	S	P	G	A	A	I	M	I	Y	J	J	H	S	J

- ☐ DISPLACEMENT
- ☐ ACCELERATION
- ☐ DISTANCE
- ☐ CIRCULAR
- ☐ UNIFORM
- ☐ BRAKING
- ☐ VECTOR
- ☐ ORIGIN
- ☐ MOTION
- ☐ SLOPE
- ☐ GRAPH
- ☐ GPS

Solo: find all words.	**Pairs:** partner 1 does straight lines, partner 2 does diagonals.	**Champion:** State the meaning out loud for every word found.

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Puzzle 3 · Scrambled Terms

Every row is a chapter word with its letters shuffled. Unscramble it. The clue in brackets is your lifeline — try to solve without it first.

1. **R T I R D N E A T O A** (negative acceleration) → _____
2. **L E E N A T I R T C P** (acceleration pointing toward a circle's centre) → _____
3. **A M I C I N S E K T** (the study of motion without worrying about forces) → _____
4. **C E D L E A T P N M S I** (straight-line change in position) → _____
5. **L T G N N T A A E I** (in the direction of a circle's edge at a point) → _____
6. **U I R L O T N O V E** (one complete loop of circular motion) → _____
7. **L E O T I N E C R E A D** (another word for slowing down) → _____
8. **I S U N T N N A A T O S E** (___ speed — what a speedometer shows right now) → _____

Beat the Bell: 60-second timer. 1 pt per word; 3 pts if you can define it.

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Puzzle 4 · Odd One Out

Three belong together. One does not. Circle the odd one — then write why in one line. The 'why' is where the marks are.

1. Distance Speed Mass Time (this chapter) Because: _____

2. Displacement Velocity Acceleration Distance Because: _____

3. Position-time graph Velocity-time graph Bar chart Slope Because: _____

4. $v = u + at$ $s = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2as$ $F = ma$ Because: _____

5. Satellite orbit Stone on a string Car braking Merry-go-round Because: _____

6. Speedometer GPS Fitness watch Thermometer Because: _____

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Puzzle 5 · Chapter Scrabble

Play in groups of 3–4. You have one shared rack of letter tiles. Build only terms from this chapter — no ordinary English words allowed.

Each letter tile used:	Its tile value
Word is a term from this chapter:	× 2
Word is 8 letters or longer:	+ 10 bonus
You can state its meaning correctly:	+ 5
You can connect it to a real-life example:	+ 3
Word is not in this chapter (challenged and lost):	− 5

Build a word → Opponents can challenge within 10s → Open textbook to verify (wrong challenger loses 5 pts) → State meaning for +5 bonus.

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Puzzle 6 · Who Am I? — Clue Cards

Read only the first clue aloud; the class guesses. Wrong guess? Read clue 2. Fewer clues used = more points. (Clue 1 = 5 pts, Clue 2 = 3 pts, Clue 3 = 1 pt).

① Total path length, direction ignored.
② Auto-rickshaw meter measures me.
③ I am distance.

① Net change in position.
② Round trip gives me a value of zero.
③ I am displacement.

① Speed with a direction attached.
② GPS navigation reports me.
③ I am velocity.

① Rate of change of velocity.
② A sudden bus brake makes you feel me.
③ I am acceleration.

① I have magnitude only, no direction.
② Distance and speed are examples.
③ I am a scalar.

① I have magnitude and direction.
② Displacement and velocity are examples.
③ I am a vector.

① On a graph, I show the rate of change.
② A steeper version means faster change.
③ I am slope.

① I always point toward the centre of a circle.
② Gravity provides me for satellites.
③ I am centripetal acceleration.

① I am negative acceleration.
② Another name for me is deceleration.
③ I am retardation.

① Doubling speed quadruples me.
② Distance a vehicle covers after brakes are applied.
③ I am braking distance.

① I fixed GPS drift caused by relativity.
② Without me, GPS drifts 10 km a day.
③ I am relativistic correction.

① I am the area under a velocity-time graph.
② I represent displacement.
③ I am the area under the curve.

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Puzzle 7 · True or False Sprint

Everyone stands. Teacher reads a statement. True → stay standing. False → sit down.
Get it wrong and you are out.

T F 1. Distance and displacement always have the same value.

T F 2. Velocity includes both speed and direction.

T F 3. A round trip has zero average displacement.

T F 4. Acceleration is the rate of change of displacement.

T F 5. A speedometer shows velocity, not just speed.

T F 6. In uniform circular motion, the object is constantly accelerating.

T F 7. Doubling your speed doubles your braking distance.

T F 8. The slope of a position-time graph gives velocity.

T F 9. The area under a velocity-time graph gives displacement.

T F 10. Retardation is another name for positive acceleration.

T F 11. Centripetal acceleration points away from the centre of a circle.

T F 12. GPS satellites must correct for effects of relativity.

T F 13. A whirled stone flies off in a straight line when released.

T F 14. The 2-second following-distance rule fully accounts for braking distance.

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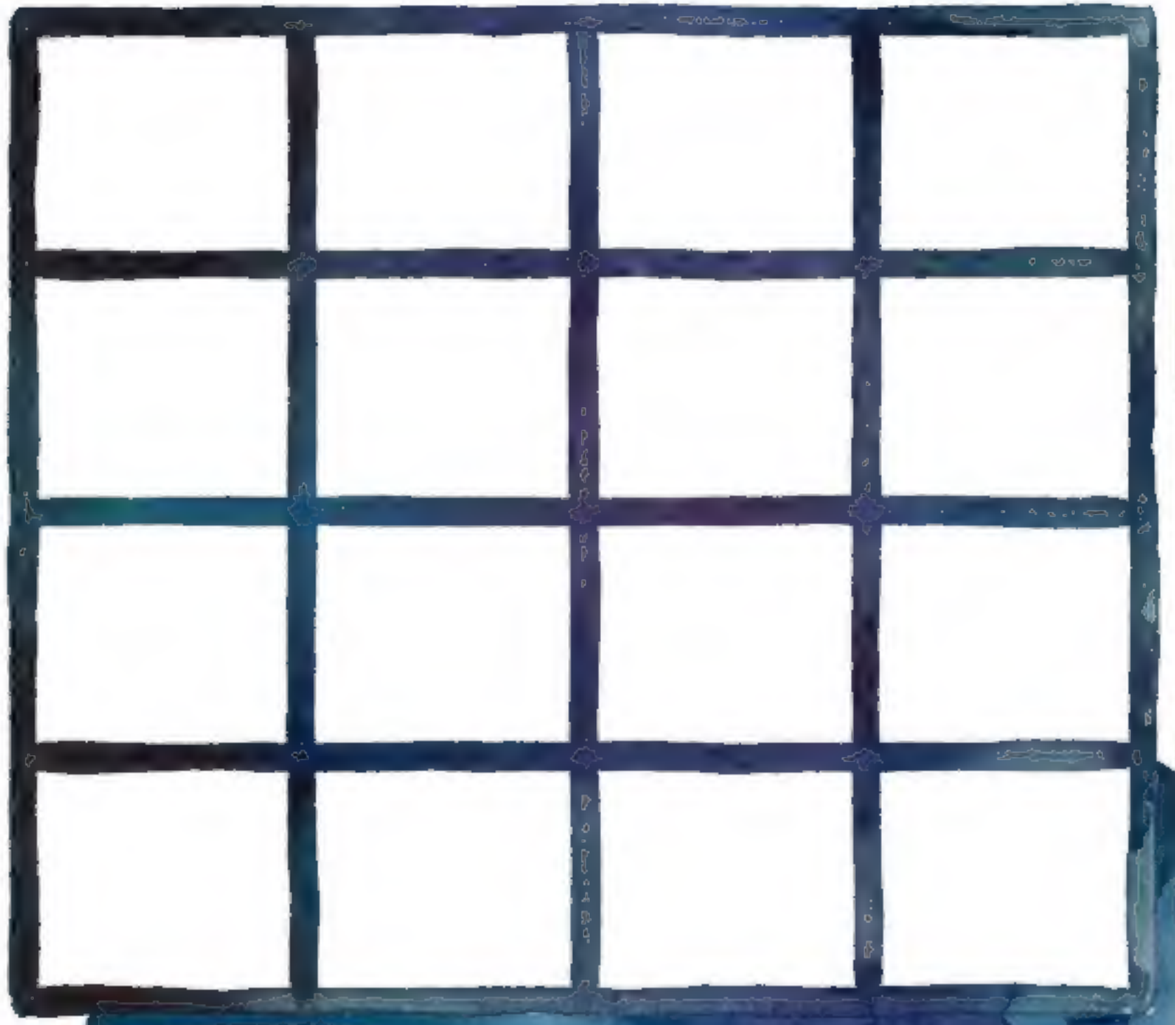
Puzzle 8 · Bingo

Fill your empty grid with all 16 words from the bank — in any order, one per box.
The teacher will read out meanings. Cross a box only when its meaning is called.

Distance
Displacement
Velocity
Acceleration
Scalar
Vector
Slope
Origin
Gudy
Uniform motion
Retardation
Centripetal
Tangential
Kinematics
Braking distance
Reference point
Revolution



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Puzzle 9 · Two Truths and a Lie

Each set has three statements. Two are true, one is a lie. Circle the lie — and correct it in one line.

Set 1

(a) A round trip has zero net displacement.
(b) A round trip always has zero distance too.
(c) Average velocity for a round trip is zero.

The lie is _____. Corrected: _____

Set 2

(a) Velocity is a vector.
(b) Speed is a vector.
(c) Displacement is a vector.

The lie is _____. Corrected: _____

Set 3

(a) In circular motion at constant speed, velocity is constant.
(b) In circular motion at constant speed, direction keeps
(c) Centripetal acceleration always points toward the centre.

The lie is _____. Corrected: _____

Set 4

(a) Braking distance is proportional to speed.
(b) Braking distance is proportional to speed squared.
(c) Doubling speed quadruples braking distance.

The lie is _____. Corrected: _____

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Puzzle 10 · The Escape Challenge

Solve all five gates. Each gives you one digit. Collect all five to unlock the exit code.

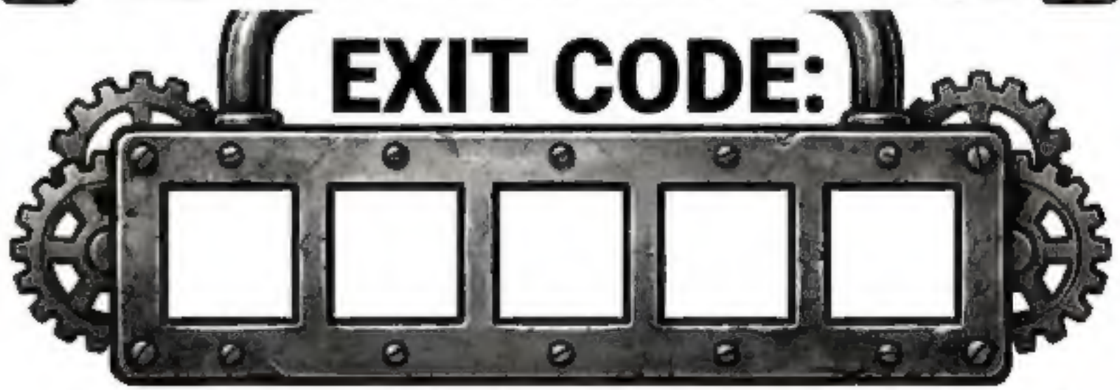
GATE 1 — The Displacement Gate:
A bowler runs back 30 m then forward 40 m.
Displacement = 40 − 30. Use that number.

GATE 2 — The Velocity Gate:
A round trip has average velocity zero.
Use the number of zeros in 'zero'. → Digit: ☐

GATE 3 — The Acceleration Gate:
A car accelerates from 0 to 20 m/s in 10 s.
a = (20-0)/10. Use that number. → Digit: ☐

GATE 4 — The Braking Gate:
A round trip has multiplies braking distance by this factor. Take the first digit. → Digit: ☐

GATE 5 — The Circular Motion Gate:
A fan does 300 rpm; the time period is 60/300 = 0.2 s. Take the first non-zero digit. → Digit: ☐



First team to reach the door with the correct code escapes!

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